UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/598,089	08/17/2006	Hiroyuki Fukuyama	88527.0004	9978

26021 7590 05/08/2009

HOGAN & HARTSON L.L.P.
1999 AVENUE OF THE STARS
SUITE 1400
LOS ANGELES, CA 90067

EXAMINER	
WOLDEKIDAN, HIBRET ASNAKE	

ART UNIT	PAPER NUMBER
2613	

MAIL DATE	DELIVERY MODE
05/08/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/598,089	FUKUYAMA ET AL.	
	Examiner	Art Unit	
	Hibret A. Woldekidan	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 August 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *08/17/06,04/09/09*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-8, 15-17,19-23,25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over DiGiovanni et al. (5659644).

Considering Claim 1 DiGiovanni discloses an optical transmission system having: an optical transmitter for transmitting light**(See Col. 3 lines 51-53, Col. 5 lines 22-32, fig. 4 i.e. a light source(49) for transmitting light through a multimode fiber(51))**; an excitation mechanism for exciting a predetermined mode in the incoherent light transmitted from the optical transmitter or the incoherent light transmitted from the optical transmitter via a multimode optical transmission line**(See Col. 5 lines 22-32, fig. 4 i.e. an excitation medium(40) for exciting the incoherent light transmitted from source(49) via a multimode fiber(51))**; and a transmission mechanism for transmitting a predetermined mode in the incoherent light transmitted from the excitation mechanism via a multimode optical transmission line**(See fig. 4 i.e. a transmission mechanism(46,62) for transmitting a predetermined signal(λp) transmitted from the excitation mechanism(40) via a multimode fiber(36))**.

DiGiovanni does not explicitly disclose an optical transmitter for transmitting incoherent light.

However as explained in Col. 3 lines 51-53, Col. 5 lines 22-32,the light emitted from the light source(49) transmitted through a multimode fiber(51). Since a multimode fiber has a larger core diameter and light propagates in multiple different paths causing the light to spread out, the emitted light becomes incoherent light. Therefore it would have been obvious to one of ordinary skilled in the art to consider the light transmitted through the multimode fiber is incoherent light.

Considering Claim 2 DiGiovanni discloses an optical transmission system having: an optical transmitter for transmitting light**(See Col. 3 lines 51-53, fig. 4 i.e. spontaneous emission source(49) for transmitting incoherent light)**; an excitation mechanism for exciting a predetermined mode in the incoherent light transmitted from the optical transmitter or the incoherent light transmitted from the optical transmitter via a multimode optical transmission line**(See Col. 5 lines 22-32, fig. 4 i.e. an excitation medium(40) for exciting the incoherent light transmitted from source(49) via a multimode fiber(51))**; a transmission mechanism for transmitting a predetermined mode in the incoherent light transmitted from the excitation mechanism via a multimode optical transmission line**(See fig. 4 i.e. a transmission mechanism(46,62) for transmitting a predetermined signal(λp) transmitted from the excitation mechanism(40) via a multimode fiber(36))**;

DiGiovanni illustrates only the transmitting side of the system. He does not show in fig. 4 an optical receiver for receiving the incoherent light transmitted from the transmission mechanism or the incoherent light transmitted from the transmission mechanism via a multimode optical transmission line.

However, DiGiovanni shows in fig. 1 the light emitted from source(12) is processed in fiber amplifiers(30) and the processed optical signal is received by utilization device(14)(See fig. 1, Col. 2 lines 45-48). Therefore it would have been obvious to one of ordinary skilled in the art to consider the utilization device(14) that receives the processed optical signal as an optical receiver.

Further, DiGiovanni does not explicitly disclose an optical transmitter for transmitting incoherent light.

However as explained in Col. 3 lines 51-53, Col. 5 lines 22-32,the light emitted from the light source(49) transmitted through a multimode fiber(51). Since a multimode fiber has a larger core diameter and light propagates in multiple different paths causing the light to spread out, the emitted light becomes incoherent light. Therefore it would have been obvious to one of ordinary skilled in the art to consider the light transmitted through the multimode fiber is incoherent light.

Considering Claim 3 DiGiovanni discloses an optical transmission system having: an optical transmitter for transmitting light**(See Col. 3 lines 51-53, fig. 4 i.e. spontaneous emission source(49) for transmitting incoherent light)**; an excitation mechanism for exciting a predetermined mode in the incoherent light transmitted from the optical transmitter or the incoherent light transmitted from the optical transmitter via a multimode optical transmission line**(See Col. 5 lines 22-32, fig. 4 i.e. an excitation medium(40) for exciting the incoherent light transmitted from source(49) via a multimode fiber(51))**; a multimode optical transmission line for transmitting the incoherent light transmitted from the excitation mechanism**(See Col. 5 lines 22-32, fig.**

4 i.e. a multimode fiber(36) for transmitting the incoherent light from the excitation medium(40)); and a transmission mechanism for transmitting a predetermined mode in the incoherent light transmitted from the excitation mechanism via the multimode optical transmission line**(See fig. 4 i.e. a transmission mechanism(46,62) for transmitting a predetermined signal(λp) transmitted from the excitation mechanism(40) via a multimode fiber(36))**.

DiGiovanni does not explicitly disclose an optical transmitter for transmitting incoherent light.

However as explained in Col. 3 lines 51-53, Col. 5 lines 22-32,the light emitted from the light source(49) transmitted through a multimode fiber(51). Since a multimode fiber has a larger core diameter and light propagates in multiple different paths causing the light to spread out, the emitted light becomes incoherent light. Therefore it would have been obvious to one of ordinary skilled in the art to consider the light transmitted through the multimode fiber is incoherent light.

Considering Claim 4 DiGiovanni discloses an optical transmission system having: an optical transmitter for transmitting light**(See Col. 3 lines 51-53, fig. 4 i.e. spontaneous emission source(49) for transmitting incoherent light)**; an excitation mechanism for exciting a predetermined mode in the incoherent light transmitted from the optical transmitter or the incoherent light transmitted from the optical transmitter via a multimode optical transmission line**(See Col. 5 lines 22-32, fig. 4 i.e. an excitation medium(40) for exciting the incoherent light transmitted from source(49) via a multimode fiber(51))**; a multimode optical transmission line for transmitting the

incoherent light transmitted from the excitation mechanism**(See Col. 5 lines 22-32, fig. 4 i.e. a multimode fiber(36) for transmitting the incoherent light from the excitation medium(40))**; a transmission mechanism for transmitting a predetermined mode in the incoherent light transmitted from the excitation mechanism via the multimode optical transmission line**(See fig. 4 i.e. a transmission mechanism(46,62) for transmitting a predetermined signal(λp) transmitted from the excitation mechanism(40) via a multimode fiber(36))**.

DiGiovanni illustrates only the transmitting side of the system. He does not show in fig. 4 an optical receiver for receiving the incoherent light transmitted from the transmission mechanism or the incoherent light transmitted from the transmission mechanism via a multimode optical transmission line.

However, DiGiovanni shows in fig. 1 the light emitted from source(12) is processed in fiber amplifiers(30) and the processed optical signal is received by utilization device(14)(See fig. 1, Col. 2 lines 45-48). Therefore it would have been obvious to one of ordinary skilled in the art to consider the utilization device(14) that receives the processed optical signal as an optical receiver.

Further, DiGiovanni does not explicitly disclose an optical transmitter for transmitting incoherent light.

However as explained in Col. 3 lines 51-53, Col. 5 lines 22-32,the light emitted from the light source(49) transmitted through a multimode fiber(51). Since a multimode fiber has a larger core diameter and light propagates in multiple different paths causing the light to spread out, the emitted light becomes incoherent light. Therefore it would

have been obvious to one of ordinary skilled in the art to consider the light transmitted through the multimode fiber is incoherent light.

Considering Claim 3 DiGiovanni discloses an optical transmission system having: an optical transmitter for transmitting light**(See Col. 3 lines 51-53, fig. 4 i.e. spontaneous emission source(49) for transmitting incoherent light)**; an excitation mechanism for exciting a predetermined mode in the incoherent light transmitted from the optical transmitter or the incoherent light transmitted from the optical transmitter via a multimode optical transmission line**(See Col. 5 lines 22-32, fig. 4 i.e. an excitation medium(40) for exciting the incoherent light transmitted from source(49) via a multimode fiber(51))**; a multimode optical transmission line for transmitting the incoherent light transmitted from the excitation mechanism**(See Col. 5 lines 22-32, fig. 4 i.e. a multimode fiber(36) for transmitting the incoherent light from the excitation medium(40))**; and a transmission mechanism for transmitting a predetermined mode in the incoherent light transmitted from the excitation mechanism via the multimode optical transmission line**(See fig. 4 i.e. a transmission mechanism(46,62) for transmitting a predetermined signal(λp) transmitted from the excitation mechanism(40) via a multimode fiber(36))**.

DiGiovanni does not explicitly disclose an optical transmitter for transmitting incoherent light.

However as explained in Col. 3 lines 51-53, Col. 5 lines 22-32,the light emitted from the light source(49) transmitted through a multimode fiber(51). Since a multimode fiber has a larger core diameter and light propagates in multiple different paths causing

the light to spread out, the emitted light becomes incoherent light. Therefore it would have been obvious to one of ordinary skilled in the art to consider the light transmitted through the multimode fiber is incoherent light.

Considering Claim 5 DiGiovanni discloses the optical transmission system according to claim 1 or 3, wherein the optical transmitter has an incoherent light source and a optical modulator for modulating light emitted from the incoherent light source and outputting the modulated light as the incoherent light**(See fig. 4 the optical transmitter(49) is an incoherent light source and the excitation mechanism(40) which is a fiber laser for modulating the incoherent light transmitted from the source(49))**.

Claim 6 is rejected for the same reason as in clam 5.

Considering Claim 7 DiGiovanni discloses the optical transmission system according to claim 5, wherein the incoherent light source is an ASE light source**(See Col. 5 lines 20-27 i.e. ASE light source)**.

Claim 8 is rejected for the same reason as in clam 7.

Considering Claim 15 DiGiovanni discloses the optical transmission system according to claim 1 or 3, wherein the predetermined mode is a base mode**(Se Col. 5 lines 24-33, fig. 4 i.e. Since λd1 and λd2 are the predetermined wavelengths that go to the excitation medium(40), the mode that λd1 and λd2 propagate can be considered as a base mode)**.

Considering Claim 16 DiGiovanni discloses the optical transmission system according to claim 1 or 3, wherein a single-mode optical transmission line is used as the

excitation mechanism**(See abstract,Col. 2 line 67-Col. 3 line 4, fig. 2 i.e. a single-mode fiber(43) used as a gain section in the excitation medium(40))**.

Considering Claim 17 DiGiovanni discloses the optical transmission system according to claim 16, wherein a single-mode optical fiber is used as the single-mode optical transmission line**(See Col. 4 lines 20-24, fig. 2 i.e. a single-mode fiber(46) used as a transmission medium)**.

Considering Claim 19 DiGiovanni discloses the optical transmission system according to claim 1 or 3, wherein the excitation mechanism includes a lens that transmits the incoherent light transmitted from the optical transmitter, a predetermined low-order mode in the incoherent light transmitted from the optical transmitter is condensed by the lens**(See Col. 3 lines 15-21,fig. 2 i.e. a lens(47) is provided for condescending a predetermined mode for propagating(λd1) and for forwarding the condensed mode to the excitation medium(40))**, and the resultant light is transmitted**(See Col. 5 lines 25-27, fig. 2 i.e. an excitation medium(40) has a lens(47) for condensing optical signals transmitted from the optical source (49))**.

Considering Claim 20 DiGiovanni does not specifically disclose the optical transmission system according to claim 1 or 3, wherein the excitation mechanism includes a diaphragm having an aperture that passes the incoherent light transmitted from the optical transmitter, a predetermined low-order mode in the incoherent light transmitted from the optical transmitter is selected by the diaphragm, and the resultant light is transmitted.

However, as explained in fig. 12 and paragraph 40 of the current application the diaphragms are used to selectively pass optical signals transmitted from the source, ***"...****the diaphragm includes a first diaphragm for passing the incoherent light transmitted from the optical transmitter and a second diaphragm for passing the incoherent light passed through the first diaphragm..."*

Similarly, DiGiovanni has two single mode fiber grating reflectors(42,44) in the excitation mechanism(40). The first grating reflector(42) for passing some of the optical light from the multimode fiber(51) and the second grating reflector(44) for passing the optical signals transmitted from the first grating reflector(42) and outputting a resulting **(See Col. 2 line 67-Col. 3 line 9, fig. 2)** .

Therefore it would have been obvious to one of ordinary skilled in the art to consider the first and the second grating reflectors as diaphragm for passing light from the multimode fiber and outputting a resulting optical signal.

Considering Claim 21 DiGiovanni discloses the optical transmission system according to claim 20, wherein the diaphragm includes a first diaphragm for passing the incoherent light transmitted from the optical transmitter and a second diaphragm for passing the incoherent light passed through the first diaphragm **(See Col. 2 line 67-Col. 3 line 9, fig. 2 i.e. the two grating reflectors(42,44) in the excitation mechanism(40). The first grating reflector(42) for passing the optical signals transmitted from the light source(49) and the second grating reflector(44) for passes the optical signals transmitted from the first grating reflector(42))**.

Considering Claim 22 DiGiovanni discloses the optical transmission system according to claim 1 or 3, wherein a single-mode optical transmission line is used as the transmission mechanism **(See Col. 4 lines 20-24, fig. 2 i.e. a single-mode fiber(46) used as a transmission medium)**.

Considering Claim 23 DiGiovanni discloses the optical transmission system according to claim 22, wherein a single-mode optical fiber is used as the single-mode optical transmission line**(See Col. 4 lines 20-24, fig. 2 i.e. a single-mode fiber(46) used as a single mode transmission medium)**.

Considering Claim 25 DiGiovanni discloses the optical transmission system according to claim 1 or 3, wherein the transmission mechanism includes a lens that transmits the incoherent light transmitted from the excitation mechanism, a predetermined low-order mode in the incoherent light transmitted from the excitation mechanism is condensed by the lens, and the resultant light is transmitted**(See Col. 5 lines 25-27, fig. 4 i.e. an excitation medium(40) has a lens(47) for condensing optical signals transmitted from the optical source (49))**.

Claim 26 is rejected for the same reason as in claim 20.

Claim 27 is rejected for the same reason as in claim 21.

3. Claims 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over DiGiovanni et al. (5659644) in view of Shigematsu et al. (5,077,814).

Considering Claim 9 DiGiovanni does not explicitly disclose the optical transmission system according to claim 3, wherein a graded-index optical transmission line is used as the multimode optical transmission line.

Shigematsu teaches the optical transmission system according to claim 3, wherein a graded-index optical transmission line is used as the multimode optical transmission line**(See Col. 3 line 65- Col. 4 line 3, fig. 5 i.e. a graded-index optical transmission line(1F) is a multi-mode optical transmission line)**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of DiGiovanni, and have the transmission system to use a graded-index optical transmission line as a multimode optical transmission line, as taught by Shigematsu, thus providing an efficient transmission system by minimizing the mode dispersion in the multimode optical path and irregularities in the output power created due to the variation in the propagation delay of signals in multimode fiber using a graded index multimode fiber, as discussed by Shigematsu (col. 2 lines 47-55).

Considering Claim 10 Shigematsu teaches the optical transmission system according to claim 9, wherein the graded-index optical transmission line takes the form of a graded-index multimode optical fiber having a core diameter of 40 μm or more and 100 μm or less**(See Col. 3 line 65- Col. 4 line 3, fig. 5 i.e. a graded index multimode fiber(IF) having a core diameter of 50μm)**.

Considering Claim 11 Shigematsu teaches The optical transmission system according to claim 9, wherein the graded-index optical transmission line takes the form of a graded-index multimode optical fiber having a core diameter of 50 μm or 62.5 μm**(See Col. 3 line 65- Col. 4 line 3, fig. 5 i.e. a graded index multimode fiber(IF) having a core diameter of 50μm)**.

Considering Claim 12 DiGiovanni does not specifically disclose the optical transmission system according to claim 3, wherein a step index optical transmission line is used as the multimode optical transmission line.

Shigematsu teaches the optical transmission system according to claim 3, wherein a step index optical transmission line is used as the multimode optical transmission line**(See Col. 5 lines 53-55 i.e. a step-index multimode optical fiber)**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of DiGiovanni, and have the transmission system to use a step index optical transmission line as a multimode optical transmission line, as taught by Shigematsu, thus providing an efficient transmission system for minimizing irregularity in the output power by controlling the spreading of light due to different propagation time in multimode fibers, as discussed by Shigematsu (col. 2 lines 39-42).

Considering Claim 13 Shigematsu teaches the optical transmission system according to claim 12, wherein the step index optical transmission line takes the form of a step index multimode optical fiber having a core diameter of 40 μm or more and 100 μm or less**(See Col. 5 lines 53-55 i.e. a step-index optical fiber having a core diameter of 50μm)**.

Considering Claim 14 Shigematsu teaches the optical transmission system according to claim 12, wherein the step index optical transmission line takes the form of a step index multimode optical fiber having a core diameter of 50 μm or 62.5 μm**(See Col. 5 lines 53-55 i.e. a step-index optical fiber having a core diameter of 50μm)**.

4. Claims 18,24 are rejected under 35 U.S.C. 103(a) as being unpatentable over DiGiovanni et al. (5659644) in view of Jordan et al. (4961618).

Considering Claim 18 DiGiovanni does not specifically disclose the optical transmission system according to claim 16, wherein a single-mode planar lightwave circuit is used as the single-mode optical transmission line.

Jordan teaches the optical transmission system according to claim 16, wherein a single-mode planar lightwave circuit is used as the single-mode optical transmission line**(See abstract, fig. 1 i.e. a single mode planer waveguide used as a single mode transmission medium)**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of DiGiovanni, and have a single-mode planar light wave circuit to be used as the single-mode optical transmission line, as taught by Jordan, thus providing an efficient transmission system by using a planner light wave circuit for removing undesired light radiations, as discussed by Jordan (col. 1 lines 29-31).

Claim 24 is rejected for the same reason as in claim 18.

Conclusions

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hibret A. Woldekidan whose telephone number is (571)270-5145. The examiner can normally be reached on 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on 5712723078. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/H. A. W./
Examiner, Art Unit 2613

/Kenneth N Vanderpuye/
Supervisory Patent Examiner, Art Unit 2613